

REMARKS

Upon entry of this amendment claims 3-4, 7-11, and 14 will be in the application, with claims 3 and 11 having been amended, and claims 7-10 withdrawn from consideration. Of the claims still under consideration, claims 3 and 11 are the independent claims herein. No new matter has been added. Entry of this amendment and further examination are respectfully requested.

Claim Rejections

Claims 3-4 are rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,744,132 ("Alcoe") in view of U.S. Patent No. 6,046,077 ("Baba"). Claims 11 and 14 are rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,570,815 ("Kashiwazaki") in view of Alcoe and Baba. Reconsideration and withdrawal of the rejections are respectfully requested.

Claims 3 and 11

Amended independent claim 3 describes an apparatus that comprises an integrated circuit package, a thermally-conductive paste, an integrated circuit die coupled to the integrated circuit package, a stiffener portion, a thermally-conductive material, and a heat sink. The stiffener portion is coupled to the integrated circuit package and surrounds the integrated circuit die. The stiffener portion and the integrated circuit package define a well in which the integrated circuit die is disposed. The thermally conductive material is disposed in the well and is disposed between the integrated circuit die and the heat sink, and is in contact with the stiffener portion and the integrated circuit die. The thermally-conductive paste is coupled to the stiffener portion, is coupled to the thermally-conductive material, and is coupled to the thermally-conductive paste. Moreover, the thermally-conductive paste is disposed between the heat sink and the thermally-conductive material.

The art of record is not seen to disclose or to suggest the above-mentioned features of amended independent claim 3. In particular, the art of record is not seen to disclose or to suggest a thermally-conductive paste that is coupled to a stiffener portion, to a heat sink, and to a thermally-conductive material, where the thermally-conductive material is in contact with the stiffener portion and an integrated circuit die and is disposed between the heat sink and the integrated circuit die, and where the thermally-conductive paste is disposed between the heat sink and the thermally-conductive material.

Baba, at FIG. 6, discloses a semiconductor device assembly having a reinforcement frame 6, a semiconductor chip 1, a plate member 11, an underfill resin 3, and a bonding resin 9. At column 4, lines 20 through 27, Baba describes injecting the underfill resin 3 into the device “so as to completely fill the gaps around the semiconductor chip 1.” FIG. 6 illustrates the bonding resin 9 disposed only between the reinforcement frame 6 and the plate member 11. Thus, the bonding resin 9 is not disposed between the plate member 11 and the underfill resin 3.

Alcoe discloses a module having an adhesively attached heat sink. Alcoe, at column 2, lines 10 through 18, describes FIG. 1 as an electronic structure using the same adhesive in three different locations. As illustrated in FIG. 1, Alcoe shows a heat sink 12 coupled to a cover plate 18 via an adhesive 21 and the cover plate 18 coupled to a stiffener ring 24 via the adhesive 21. Moreover, as illustrated in FIG. 1, a semiconductor device 37 is coupled to the cover plate 18 via the adhesive 21 and no other material is disposed between the semiconductor device 37 and the cover plate 18.

Accordingly, nowhere can Baba or Alcoe be seen to disclose or to suggest a thermally-conductive paste that is coupled to a stiffener portion, to a heat sink, and to a thermally-conductive material, where the thermally-conductive material is in contact with the stiffener portion and an integrated circuit die and is disposed between the heat sink and the integrated circuit die, and where the thermally-conductive paste is disposed between the heat sink and the thermally-conductive material.

The remaining art of record has been reviewed and is not seen to remedy the foregoing deficiencies in Baba or Alcoe. Therefore, the art of record taken in any permissible combination is not seen to disclose or to suggest a thermally-conductive paste that is coupled to a stiffener

portion, to a heat sink, and to a thermally-conductive material, where the thermally-conductive material is in contact with the stiffener portion and an integrated circuit die and is disposed between the heat sink and the integrated circuit die, and where the thermally-conductive paste is disposed between the heat sink and the thermally-conductive material.

In view of the foregoing, amended independent claim 3 is believed to be in condition for allowance. Claim 4 depends from claim 3 and is therefore also believed to be allowable for at least the foregoing reasons.

Amended independent claim 11 describes a system that includes the apparatus of claim 3. In view of the foregoing, amended independent claim 11 and its related dependent claim are therefore also believed to be in condition for allowance.

CONCLUSION

The outstanding Office Action presents a number of characterizations regarding the applied references, some of which are not directly addressed by this response. Applicant does not necessarily agree with the characterizations and reserves the right to further discuss those characterizations.

For at least the reasons given above, it is submitted that the entire application is in condition for allowance and such action is respectfully requested at the Examiner's earliest convenience. Alternatively, if there remains any question regarding the present application or any of the cited references, or if the Examiner has any further suggestions for expediting allowance of the present application, the Examiner is kindly invited to contact the undersigned via telephone at (203) 972-4982.

Respectfully submitted,

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Date



Richard S. Finkelstein
Registration No. 56,534
Buckley, Maschoff & Talwalkar LLC
Attorneys for Intel Corporation
Five Elm Street
New Canaan, CT 06840
(203) 972-4982